



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,595	10/18/2001	Chong Chin Hui	TI-27874	7591

23494 7590 02/05/2003

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

[REDACTED] EXAMINER

PAREKH, NITIN

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 02/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/982,595	HUI ET AL.
	Examiner Nitin Parekh	Art Unit 2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 18 October 2001.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.
- 4) Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-12 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Disposition of Claims

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 12 is objected to because of the following informalities:

Claim 12, line 1: Delete "claim 10" and insert ----"claim 11"----.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollingsworth et al (US Pat. 5521428).

Regarding claim 1, Hollingsworth et al disclose a die pad/support configuration having an integrated circuit (IC) die (65 in Fig. 6), the die pad/support comprising:

- a plurality of die pad/support regions or support portions for supporting the die, each die pad/support region having an area associated with (63 in Fig. 6), and

- the die pad/support regions being arranged in a spaced apart relationship with respect to the die, the regions being rectangular in shape and being in four corner regions of the die
(Fig 6.; Col. 6, line 25- 37; Col. 3-7).

Hollingsworth et al further show the dimensions in the Figure 6 such that the total area of the die pad/support regions in direct contact with the die is less than about 30% of the bottom surface area of the die (see areas 63 and 65 in Fig. 6) so that delamination and stress/cracking related defects can be reduced to provide stress relief in an encapsulated package (Col. 4, line 1-15; Col. 6, line 5-65) but Hollingsworth et al fail to specify the total area of the die pad regions being at most equal to 50% of the area of the die.

However, Hollingsworth et al further disclose selecting a variety of configurations for the die pad/support regions having different shapes and sizes such as U-shape, H-shape, rounded edge, etc. to further reduce stress, improve support and to accommodate various die sizes/dimensions in the encapsulated package (Col. 6, line 25-47).

Furthermore, determination of parameters such as die support area, number of die support regions, thickness of the die pad/metal support, area ratio of die to die pad support region, etc. with respect to the die dimensions including the area, thickness, etc. in chip packaging and encapsulation technology art is a subject of routine

Art Unit: 2811

experimentation and optimization to achieve the desired yield and reliability and to prevent the encapsulation defects such as void formation, cracking defects, etc.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to arrive at the total area of the die pad regions being at most equal to 50% or a value between 0-50% of the area of the die so that delamination, void formation and stress/cracking related encapsulation defects can be reduced in Hollingsworth et al's die pad configurations.

Regarding claim 2, as explained above for claim 1, Hollingsworth et al disclose the die pad/support region including four regions.

Regarding claim 3, as explained above for claim 1, Hollingsworth et al disclose the die pad/support regions being spaced apart such that they are proximate to a corner of the die.

Regarding claim 4, as explained above for claim 1, Hollingsworth et al teach selecting the total area of the die pad regions being about 0.32 of the area of the die.

Regarding claim 5, Hollingsworth et al further disclose the die pad/support regions including two rectangular regions (not numerically referenced in Fig. 5 - see overlapping support areas of 53 and 54 in Fig. 5; Col. 6, line 1-15).

Art Unit: 2811

Regarding claim 6, as explained above for claim 5, Hollingsworth et al further disclose the die pad/support regions being spaced apart such that they are proximate to an opposing edge of the die (not numerically referenced in Fig. 5 - see overlapping support areas of 53 and 54 in Fig. 5; Col. 6, line 1-15).

Regarding claim 7, as explained above for claim 1, Hollingsworth et al teach selecting the total area of the die pad regions being about 0.42 of the area of the die.

Regarding claim 8, as explained above for claim 1, Hollingsworth et al teach using a die pad/support structure comprising the support portions/regions having a plurality of regions of relief/stress reduction, the relief regions being arranged in a spaced apart relationship with respect to the die and further selecting the total area of the support portion being about 40% of the area of the die.

Regarding claim 9, as explained above for claims 1 and 8, Hollingsworth et al teach using four rectangular relief regions.

Regarding claim 10, as explained above for claims 1, 3, 8 and 9, Hollingsworth et al teach using the relief regions being spaced apart such that they are proximate to a corner of the die.

Regarding claim 11, as explained above for claims 1, 5 and 8, Hollingsworth et al teach using the relief regions being two rectangular regions.

Regarding claim 12, as explained above for claims 1, 6, 8 and 11, Hollingsworth et al teach using the two relief regions being spaced apart such that they are proximate to an opposing edge of the die.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 703-305-3410. The examiner can normally be reached on 09:00AM-05:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722, 703-308-7724 or 703-872-9318 (Right FAX) for regular communications; 703-872-9310 (Right FAX) for After Final communications and 703-872-9310 (Right FAX) for customer service.

Art Unit: 2811

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Nitin Parekh

NP
01-29-03



091 NOA